

the side of another; but the general result was that the largest quantity of gases was evolved at the smallest electrodes, namely, those consisting merely of platina wires.

450. Experiments of a similar kind were made with the single-plate, straight tubes (442), and also with the curved tube's (443), with similar consequences; and when these, with the former tubes, were arranged together in various ways, the result, as to the equality of action of large and small metallic surfaces when delivering and receiving the same current of electricity, was constantly the same. As an illustration, the following numbers are given. An instrument with two wires evolved 74.3 volumes of mixed gases; another with plates 73.25 volumes; whilst the sum of the oxygen and hydrogen in two separate tubes amounted to 73.65 volumes. In another experiment the volumes were 55.3, 55.3, and 54.4.

451. But it was observed in these experiments, that in single-plate tubes (442) more hydrogen was evolved at the negative electrode than was proportionate to the oxygen at the positive electrode; and generally, also, more than was proportionate to the oxygen and hydrogen in a double-plate tube. Upon more minutely examining these effects, I was led to refer them, and also the differences between wires and plates (449), to the solubility of the gases evolved, especially at the positive electrode.

452. When the positive and negative electrodes are equal in surface, the bubbles which rise from them in dilute sulphuric acid are always different in character. Those from the positive plate are exceedingly small, and separate instantly from every part of the surface of the metal, in consequence of its perfect cleanliness (369); whilst in the liquid they give it a hazy appearance, from their number and minuteness; are easily carried down by currents; and therefore not only present far greater surface of contact with the liquid than larger bubbles would do, but are retained a much longer time in mixture with it. But the bubbles at the negative surface, though they constitute twice the volume of the gas at the positive electrode, are nevertheless very inferior in number. They do not rise so universally from every part of the surface, but seem to be evolved at different points; and though so much larger, they appear to cling to the

metal, separating with difficulty from it, and
when separated
instantly rising to the top of the liquid. If,
therefore, oxygen
and hydrogen had equal solubility in, or powers
of combining
with, water under similar circumstances, still
under the present
conditions the oxygen would be far the most liable
to solution;